(19) Japan Patent Office (JP)

(11) Japanese Unexamined Utility Model Publication Number

(12) **Japanese Unexamined Utility Model Publication** (U)

H04-097856

(51) Int. Cl. [5]	Identification Codes	JPO File Numbers	(43) Publication Date: 25 August 1992
C 25 D 5/02	C	6919-4K	
7/12		6919-4K	

Request for Examination: Not filed; Number of Inventions: 2 (Total of 2 pages)

(21) Japanese Patent Application	H03-000338 (U)	
(22) Date of Application	10 January 1991	
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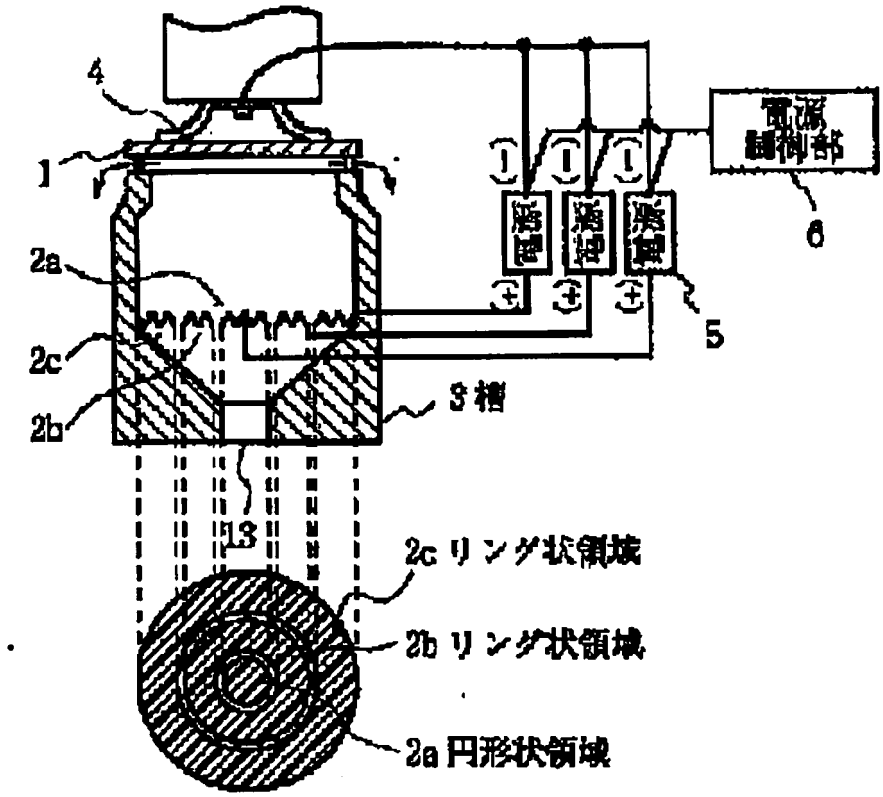
(54) [Title of the Invention] Plating Treatment Device

(57) [Abstract]

[Constitution] An anode electrode is disposed within the device, and a tank 3 is provided in which the plating liquid is sprayed through the bottom portion. The anode electrode is divided into a circular area 2a in the center portion and ring-shaped areas 2b and 2c that surround this circular area 2a. Power sources 5 are connected to these areas, and a power source controller 6 is provided to control the different currents that are generated by these power sources 5, such that the current density varies between the semiconductor substrate 1 and the respective areas 2a, 2b and 2c.

[Effect] This device makes uniform plating treatment possible based on one principal surface of a semiconductor substrate.



2a: Circular area

2b: Ring-shaped area

2c: Ring-shaped area

3: Tank

5: Power sources (3)

6: Power source controller

[Claims]

[Claim 1] A plating treatment device comprising a cup-shaped tank, a means for spraying a plating liquid through the bottom portion of this tank as it passes through an anode electrode, and a cathode electrode that makes contact with a mounted semiconductor substrate such that the opening of the aforementioned tank is covered, wherein a ring-shaped insulating plate containing holes is disposed within the center portion between the aforementioned anode and cathode electrodes

[Claim 2] A plating treatment device comprising a cup-shaped tank, a means for spraying the plating liquid through the bottom portion of this tank as it passes through an anode electrode, and a cathode electrode that makes contact with a mounted semiconductor substrate such that the opening of the aforementioned tank is covered, wherein said device is divided into a circular area in the center portion of the anode electrode and multiple ring-shaped areas that surround this circular area, and a power source controller is provided to apply varying current densities to these respective areas

[Brief Description of the Drawings]

[Fig. 1] This is a cross-sectional view of the tank for the plating treatment device shown in the first embodiment of this invention.

[Fig. 2] This is a cross-sectional view of the tank as well as a plan view of the anode electrode for the plating treatment device shown in the second embodiment of this invention.

[Fig. 3] This is a drawing that provides an example of a conventional plating treatment device.

[Description of Symbols]

1: Semiconductor substrate

2: Anode electrode

2a: Circular area

2b, 2c: Ring-shaped areas

3: Tank

4: Cathode electrode

5: Power sources

6: Power source control portion

7: External tank

8: Thermal heater

9: Plating liquid

10: Filter

11: Pump

12: Control plate

13: Introduction port

Fig. 1

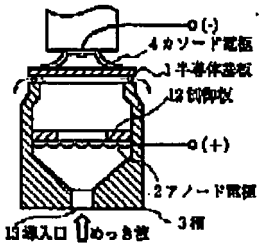


Fig. 2

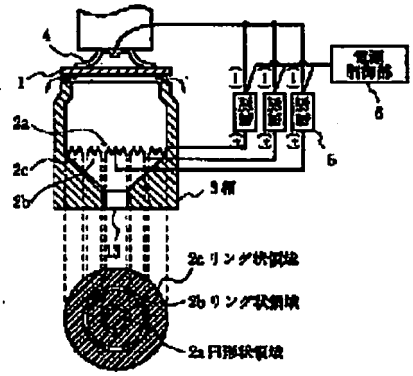
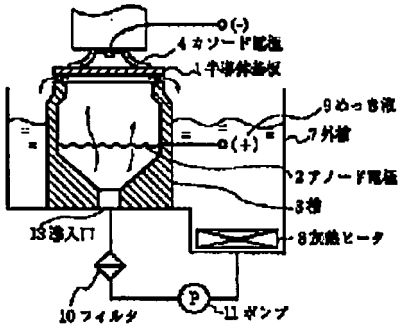


Fig. 3



[Brief Description of the Invention]

[0001]

[Industrial Field of Application]

This invention pertains to a plating treatment device in which treatment is conducted by spraying a plating liquid onto the primary surface of a semiconductor substrate.

[0002]

[Prior Art]

Figure 3 shows a plating treatment device found in a conventional example.

[0003]

As shown in Fig. 3, for example, this type of plating treatment device was conventionally composed of a cup-shaped tank 3 equipped with a plating liquid introduction port 13 and an anode electrode 2, a filter 10 and pump 11 through which the plating liquid 9 flows on its way toward the introduction port 13 of this tank 3, an external tank 7 for storing the plating liquid that flows out and downward from the tank 3 once it has passed through the anode electrode 2 and is sprayed, a cathode electrode 4 that makes contact with a semiconductor substrate 1 that is mounted such that the opening of the tank 3 is covered, and a heater 8 that is located within the external tank 7 and heats the plating liquid.

[0004]

Using this type of plating treatment device, a wiring pattern or an electrode bump is formed onto the semiconductor substrate 1. Further, with regard to the operation of this plating treatment device, the semiconductor substrate 1 is mounted over the opening of the tank 3 and acts as a cover, the plating liquid is sent in through the introduction port 13 at the bottom of the

tank 3, plating treatment of the primary surface of the semiconductor substrate 1 is conducted by applying a potential difference to the anode electrode 2 and cathode electrode 4, and the wiring pattern or bump is formed. In addition, the plating liquid that flows outward and down from the tank 1 [sic; should be 3] is stored in the external tank 7, at which point the plating fluid is heated to a specified temperature by the heater 8 and forced back into the tank 1 [sic; should be 3] by means of the pump 11.

[0005]

[Problem to be Solved by the Invention]

The conventional plating treatment device described above is designed such that the semiconductor substrate and anode electrode oppose one another at a specified distance. However, there is a tendency for dispersion of plating thickness along the treated surface of the semiconductor substrate, which is to say that the plating thickness at the center of the semiconductor substrate becomes thin while the plating thickness at the peripheral areas of the semiconductor substrate becomes thick. This presents a problem in the form of reduced production yield.

[0006]

The objective of this invention is to present a plating treatment device that resolves the problem noted above.

[0007]

[Means for Solving the Problem]

The first plating treatment device described in this invention is disposed with a ring-shaped insulation plate between the anode electrode and cathode electrode noted above in which holes are provided in the center portion.

[0008]

Further, in the second plating treatment device described in this invention, the anode noted above is divided into a circular area in the center portion and multiple ring-shaped areas that surround this circular area, and a power source controller is provided to apply varying current densities to these respective areas.

[0009]

[Embodiments]

Next, a description of this invention is provided using drawings as reference. Fig. 1 is a cross-sectional view of the tank portion of the plating treatment device to illustrate the first embodiment of this invention. In this plating treatment device, as shown in the same drawing, between the semiconductor substrate and anode electrode that oppose one another at a specified distance is an insulating ring-shaped control plate 12 with a given inner diameter. The rest of this embodiment is the same as the conventional model.

[0010]

By changing the size of the inner diameter of this control plate 12, it is possible to change the current density that flows between the semiconductor substrate 1 and the anode electrode 2, and the plating efficiency in the center portion of the semiconductor substrate 1 increases while the plating efficiency in the peripheral areas of the semiconductor substrate 1 decreases, thus making it possible to reduce plating thickness dispersion.

[0011]

Fig. 2 provides a cross-sectional view of the tank as well as a plan view of the anode electrode for the plating treatment device to illustrate the second embodiment of this invention. In this plating treatment device, as shown in the same drawing, the anode electrode that opposes

the semiconductor substrate 1 is divided into a circular area 2a in the center portion and ring-shaped areas 2b and 2c that surround this circular area 2a, and these areas are provided with power sources 5 that are connected to these areas as well as a power source controller 6 for controlling the different currents that are generated by these power sources. The rest of this embodiment is the same as the conventional model. As such, the anode electrode is divided into three areas, and by changing the current density that flows between these areas and the cathode electrode 4, it becomes possible to reduce plating thickness dispersion. Further, even if the power source 5 in this embodiment is a functional power source, control can be conducted in real time, and moreover, it is possible to make corrections easily with respect to each type of semiconductor substrate 1.

[0012]

[Effect of the Invention]

In the invention described above, by using an insulation plate or a divided anode electrode as a means for changing the current density that flows between the semiconductor substrate and anode electrode, the effect is to obtain a plating treatment device in which it is possible to conduct uniform plating treatment on the semiconductor substrate surface.